



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/642,916	08/18/2003	Olov B. Karlsson	G0603	3880

45305 7590 11/16/2004

RENNER, OTTO, BOISSELLE & SKLAR, LLP (AMDS)  
1621 EUCLID AVE - 19TH FLOOR  
CLEVELAND, OH 44115-2191

EXAMINER

SCHILLINGER, LAURA M

ART UNIT PAPER NUMBER

2813

DATE MAILED: 11/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<p align="center"><b>Office Action Summary</b></p>	<p>Application No.</p> <p>10/642,916</p>	<p>Applicant(s)</p> <p>KARLSSON ET AL.</p>	
	<p>Examiner</p> <p>Laura M Schillinger</p>	<p>Art Unit</p> <p>2813</p>	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 October 2003.
- 2a) ☐ This action is FINAL.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 10-30 is/are pending in the application.
- 4a) Of the above claim(s) 10-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 21-30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>10/20/03</u> .  | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Election/Restrictions*

This application contains claims directed to the following patentably distinct species of the claimed invention:

Species 1, claims 10-20, pertaining to a method of forming an STI region in a semiconductor material;

Species 2, claims 21-30, pertaining to a method of enhancing carrier mobility in a active region.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, there is no generic.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

During a telephone conversation with David Galin on 11/05/04 a provisional election was made with traverse to prosecute the invention of Species 2, claims 21-30. Affirmation of this election must be made by applicant in replying to this Office action. Claims 10-20 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 21-29 are rejected under 35 U.S.C. 102(e) as being anticipated by Park et al ('866).

Park et al teaches the following claimed limitations as cited below:

21. (New) A method of enhancing carrier mobility in a semiconductor active region of a semiconductor device, comprising:

- providing a layer of semiconductor material (Fig.5A (40));
- providing a trench isolation region in the layer of semiconductor region that defines placement of the active region, the trench isolation region defined by sidewalls and a bottom (Fig.5B (47) ) and includes:

- a liner made from a material having a relative permittivity (K) of about 10 or more, the liner conforming to the sidewalls and bottom (Fig.5C (50- SiN=9)); and

- a fill section made from isolating material that is disposed within and conforms to the liner (Fig.5D (52)); and

- exerting a mechanical stress on the active region with the liner to enhance carrier mobility within the active region (Col.7, lines: 55-65).

22. (New) The method according to claim 21 , further comprising forming the semiconductor device using an active region and wherein the liner has a compressive stress to compress the active region, the compressive stress effective to enhance electron mobility within the active region (Col.7, lines: 55-65).

23. (New) The method according to claim 22, wherein the semiconductor device is an NMOS device (Col.2, lines: 35-40).

24. (New) The method according to claim 21 , further comprising forming the semiconductor device using an active region and wherein the liner has a tensile stress to strain the active region, the tensile stress effective to enhance hole mobility within the active region (Col.7, lines: 15-30).

25. (New) The method according to claim 24, wherein the semiconductor device is a PMOS device (Col.2, lines:35-40).

26. (New) The method according to claim 21 , wherein the fill section is composed of one or more materials selected from silicon oxide, silicon nitride, polysilicon and mixtures thereof (Col.6, lines: 15-25)).

27. (New) The method according to claim 26, wherein the fill section is deposited using chemical vapor deposition (CVD) (Col.6, lines: 15-25).

28. (New) The method according to claim 21, wherein the layer of semiconductor material is a semiconductor film disposed on an insulating layer, the insulting layer being disposed on a semiconductor substrate (Fig.5A (42))).

29. (New) The method according to claim 28, wherein the bottom of the trench is defined by the insulating layer (Fig.5C (50)).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Park ('866) as applied to claims above, and further in view of Gardner.

30. (New) The method according to claim 21 , Park teaches to use SiN as a trench liner however fails to teach wherein the liner has a relative permittivity (K) of about 20 or more.

However, Gardner teaches implementing a trench liner with a high-K dielectric (Col.4, lines: 60-65).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Park to include a high-K trench liner as taught by Gardner because it provides for shallower junctions and provides a deeper implant into subsequent polysilicon structures (See Gardner Col.4, lines: 60-65).

Art Unit: 2813

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Laura M Schillinger whose telephone number is (571) 272-1697. The examiner can normally be reached on M-T, R-F 7:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W Whitehead, Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
LMS

11/10/04